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Appl. No. 10/708,051
Docket No. PES-D-03-008/PES-0188

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) Power electronics for an electrochemical cell system, the power electronics comprising:

a first power converter including:

a plurality of interchangeable power converter modules, each power converter module disposed upon a single circuit board; and

a first expandable motherboard configured to receive the plurality of interchangeable power converter modules;

wherein a power rating of the first power converter is capable of being changed by adjusting a number of the interchangeable power converter modules attached to the first expandable motherboard.

2. (currently amended) The power electronics of Claim 1, further comprising:

a controller configured to adjust a current output from the interchangeable power converter modules attached to the first expandable motherboard.

3. (currently amended) The power electronics of Claim 2, further comprising:

a second power converter including:

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a second expandable motherboard configured to receive at least a portion of the plurality of interchangeable power converter modules;

wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the second expandable motherboard.

4. (currently amended) The power electronics of Claim 3, wherein;

the controller is further configured to adjust a current output from the interchangeable power converter modules attached to the second expandable motherboard; and

the controller is a single controller configured to adjust a current output from each of the interchangeable power converter modules attached to the first expandable motherboard and from each of the interchangeable power converter modules attached to the second expandable motherboard.

5. (original) The power electronics of Claim 4, wherein the first power converter is one of an AC-to-DC converter and a DC-to-DC converter, and the second power converter is one of an AC-to-DC converter and a DC-to-DC converter.

6. (original) The power electronics of Claim 2, wherein each power converter module in the plurality of power converter modules includes:

a first chopping circuit configured to receive a first DC input and provide a first AC output;

a first transformer configured to adjust a power of the first AC output and provide a first transformed AC output; and

a first rectifier configured to receive the first transformed AC output and provide a first DC output.

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7. (original) The power electronics of Claim 6, wherein the each power converter module in the plurality of power converter modules includes:

a first half-module including the first chopping circuit, the first transformer, and the first rectifier; and

a second half-module including:

a second chopping circuit configured to receive a second DC input and provide a second AC output;

a second transformer configured to adjust a power of the second AC output and provide a second transformed AC output; and

a second rectifier configured to receive the second transformed AC output and provide a second DC output.

8. (original) The power electronics of Claim 7, wherein the first DC output from the first half-module and the second DC output from the second half-module are controlled by the controller.

9. (currently amended) The power electronics of Claim 4, wherein the first expandable motherboard, the second expandable motherboard, and the controller are mounted in a common power converter box.

10. (currently amended) The power electronics of Claim 2, wherein the controller is configured to receive signals from the interchangeable power converter modules attached to the first expandable motherboard, the signals indicating at least one of: an output current, a temperature, a fuse status, an output voltage, an input voltage, and combinations including two or more of the foregoing.

11. (currently amended) An electrochemical cell system, comprising:

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a first power source;

an electrochemical cell; and

a modular power electronics system electrically connected between the first power source and the electrochemical cell, the modular power electronics system including:

a first power converter adapted for conditioning electrical current flow between the first power source and the electrochemical cell, the first power converter including:

a plurality of interchangeable power converter modules, each power converter module disposed upon a single circuit board; and

a first expandable motherboard configured to receive the plurality of interchangeable power converter modules;

wherein a power rating of the first power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the first expandable motherboard.

12. (currently amended) The electrochemical cell system of Claim 11, wherein the modular power electronics system further includes:

a controller configured to adjust a current output from the interchangeable power converter modules attached to the first expandable motherboard.

13. (currently amended) The electrochemical cell system of Claim 12, further comprising:

a second power source, wherein the modular power electronics system is electrically connected between the second power source and the electrochemical cell; and

wherein the modular power electronics system further includes:

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a second power converter adapted for conditioning electrical current flow between the second power source and the electrochemical cell, the second power converter including:

a second expandable motherboard configured to receive at least a portion of the plurality of interchangeable power converter modules;

wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the second expandable motherboard.

14. (currently amended) The electrochemical cell system of Claim 13, wherein the controller is further configured to adjust a current output from the interchangeable power converter modules attached to the second expandable motherboard.

15. (original) The electrochemical cell system of Claim 14, wherein the first power converter is one of an AC-to-DC converter and a DC-to-DC converter, and the second power converter is one of an AC-to-DC converter and a DC-to-DC converter.

16. (original) The electrochemical cell system of Claim 12, wherein each power converter module in the plurality of power converter modules includes:

a first chopping circuit configured to receive a first DC input and provide a first AC output;

a first transformer configured to adjust a power of the first AC output and provide a first transformed AC output; and

a first rectifier configured to receive the first transformed AC output and provide a first DC output.

17. (original) The electrochemical cell system of Claim 16, wherein the each

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power converter module in the plurality of power converter modules includes:

a first half-module including the first chopping circuit, the first transformer, and the first rectifier; and

a second half-module including:

a second chopping circuit configured to receive a second DC input and provide a second AC output;

a second transformer configured to adjust a power of the second AC output and provide a second transformed AC output; and

a second rectifier configured to receive the second transformed AC output and provide a second DC output.

18. (original) The electrochemical cell system of Claim 17, wherein the first DC output from the first half-module and the second DC output from the second half-module are controlled by the controller.

19. (currently amended) The electrochemical cell system of Claim 14, wherein the first expandable motherboard, the second expandable motherboard, and the controller are mounted in a common power converter box.

20. (currently amended) The electrochemical cell system of Claim 12, wherein the controller is configured to receive signals from the interchangeable power converter modules attached to the first expandable motherboard, the signals indicating at least one of: an output current, a temperature, a fuse status, an output voltage, an input voltage, and combinations including two or more of the foregoing.

21. (original) The electrochemical cell system of Claim 12, wherein the controller is in operable communication with a controller for the electrochemical cell.

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22. (currently amended) A method of configuring power electronics for an electrochemical cell system, the power electronics including a first power converter, the method comprising:

configuring the first power converter such that its power rating is adjustable by changing a number of interchangeable power converter modules, each power converter module disposed upon a single circuit board and attached to a first expandable motherboard of the first power converter.

23. (currently amended) The method of Claim 22, further comprising:

configuring a plurality of the interchangeable power converter modules attached to the first expandable motherboard such that an associated current output is adjustable using a single controller.

24. (currently amended) The method of Claim 23, wherein the power electronics are housed within a power converter box and include a second power converter, the method further comprising:

configuring the power converter box housing the first expandable motherboard and the single controller such that a second expandable motherboard may be included therein; and

configuring the second power converter such that its power rating is adjustable by changing a number of the interchangeable power converter modules attached to the second expandable motherboard.

25. (currently amended) The method of Claim 24, further comprising:

configuring a plurality of the interchangeable power converter modules attached to the second expandable motherboard such that an associated current output is adjustable using the single controller.

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26. (original) The method of Claim 24, wherein the first power converter is one of an AC-to-DC converter and a DC-to-DC converter, and the second power converter is one of an AC-to-DC converter and a DC-to-DC converter.

27. (currently amended) The method of Claim 23, further comprising:

configuring the interchangeable power converter modules attached to the first expandable motherboard to provide signals to the controller, the signals indicating at least one of: an output current, a temperature, a fuse status, an output voltage, an input voltage, and combinations including two or more of the foregoing.

28. (currently amended) The power electronics of Claim 2, further comprising:

a second power converter including:

at least a portion of the plurality of interchangeable power converter modules attached to the first expandable motherboard, wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the first expandable motherboard.

29. (currently amended) The electrochemical cell system of claim 12, further comprising:

a second power source, wherein the modular power electronics system is electrically connected between the second power source and the electrochemical cell; and

wherein the modular power electronics system further includes:

a second power converter adapted for conditioning electrical current flow between the second power source and the electrochemical cell, the second power converter including:

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at least a portion of the plurality of interchangeable power converter modules attached to the first expandable motherboard, wherein a power rating of the second power converter is capable of being adjusted by changing a number of the interchangeable power converter modules attached to the first expandable motherboard.

30. (currently amended) The method of claim 22, wherein the power electronics include a second power converter, the method further comprising:

configuring the second power converter such that its power rating is adjustable by changing a number of the interchangeable power converter modules attached to the first expandable motherboard.

31. (previously presented) The electrochemical cell system of Claim 11, wherein:

the electrochemical cell is an electrolysis cell.

32. (currently amended) The electrochemical cell system of Claim 11, wherein:

the plurality of interchangeable power converter modules receive a generated grid input voltage from the first motherboard, and provide a programmable output voltage in parallel to the electrochemical cell.